# FAA | AVIATION NEWS

AUGUST 1962

FEDERAL AVIATION AGENCY

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## WORKING TOGETHER

As you read through this issue, note the number of stories about activities that contribute to aviation progress through joint effort.

As in many other technical areas, operators and manufacturers have joined with the FAA in an effort to find equipment and techniques that will help pilots avoid collisions in the air. The COPAG group coordinates a government-industry campaign to advance technology in this area.

The annual Federal Aid Airports Program tells another story of joint endeavor. The Federal government matches local funds to provide adequate ground facilities for aviation. FAA also provides technical aid to support local programs.

The pilot-to-forecaster program, another cooperative effort, is being expanded. Here, pilots flying in certain trial areas can get weather information direct from the forecaster. In turn, pilots give forecasters valuable reports on current weather conditions aloft. These pilot reports—PIREPS—then are made available to other pilots.

En route VFR flying gets a navigation boost from a simple aid—the air marker—which depends almost entirely on local response to FAA promotion and guidance.

A cooperative approach to the Agency's rulemaking process is evident in the new philosophy described in this issue. The FAA has put its philosophy in an official order for the first time, and it calls for close consultation with all segments of aviation.

Clear understanding of FAA programs and policies is an essential prerequisite to airman cooperation in making our aviation system work safely and effectively. That is why Administrator N. E. Halaby met with general aviation pilots in Cincinnati last month to exchange views. It was the latest in a series of sessions the FAA is holding with airmen of all type.

These are just a few examples, of course, of the ways various elements of the aviation community work together. This cooperation is essential if we are to make the present national aviation system really safe and effective. Unified effort is even more vital to continued progress in aviation.

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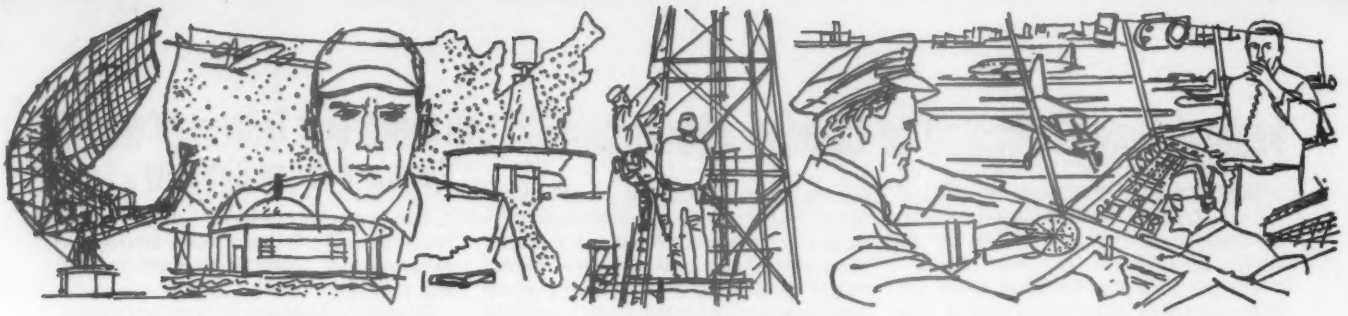
**COVER:** *Typical of airport improvement programs across the Nation is the new TWA terminal building at New York's Idlewild Airport, designed by the late Eero Saarinen, who also designed the terminal building at Dulles International Airport.* Photo by Ezra Stoller Associates.

**FAA AVIATION NEWS** is published monthly by the Office of Public Affairs, Federal Aviation Agency, Washington 25, D.C., in the interest of aviation safety and to acquaint readers with the policies and programs of the Agency. Use of funds for printing this publication approved by the Director of the Bureau of the Budget January 25, 1962. Subscription rates: U.S. $1.50 a year, foreign $2.00 a year, single copies 15 cents. Send check or money order (no stamps) to Superintendent of Documents, Government Printing Office, Washington 25, D.C.



# MID-AIR COLLISION PREVENTION DISCUSSED BY FAA AND INDUSTRY

The problems of mid-air collisions, which have taken 874 lives in the past quarter-century of American civil aviation, were discussed last month in Washington during an FAA-sponsored two-day symposium which explored the problem of collisions and what's being done to prevent them.

FAA and a small family of contractors have been working for several years to develop airborne electronic collision-prevention hardware and techniques. So have other government agencies and private concerns. The FAA has put a little over $1 million into the program since 1958.

The Agency approach is three-pronged:

- The computer-based, sophisticated Collision Avoidance System (CAS) would detect aircraft, evaluate collision threat and determine the collision-evading maneuver to be executed by human pilot or automatic pilot.
- The less-complex Pilot Warning Instruments (PWI) would alert the pilot to aircraft in the same altitude segment and provide bearing, range and other appropriate information. In this case, the pilot would be on his own so far as evasive maneuvers are concerned.
- The Conspicuity Enhancement program has included extensive work with high visibility paints, lights and other devices to make aircraft easier to pick out against a broad variety of backgrounds and in differing conditions of visibility.

Work moves ahead steadily in each area. But tough electronic problems associated with the CAS and PWI programs continue to defy solution. Scientists associated with the program both in and out of the government have suggested that a breakthrough in these areas may still lie "years ahead."

Against this background, FAA and its 10-member, government-private Collision Prevention Advisory Group (COPAG) on July 12 and 13 convened a broad cross-section of the aviation and electronic industries to review research and development work in the anti-collision field, outline accomplishments to date, underline problem areas, and discuss future plans and programs.

Presentations were made by the Bendix Corp., Sperry Gyroscope Corp., Collins Radio Co., The National Company, Navy and Army research scientists, and top FAA officials and technical personnel.

Addresses by Robert J. Shank, FAA's Deputy Administrator for Development, and Joseph D. Blatt, Director of FAA's Systems Research and Development Service, set the tone of the symposium.

"This distinguished group is here to discuss one of the great problems of our age," Shank said. "It is an extremely difficult one to solve. But it will be solved."

Blatt told the COPAG assemblage of some 250 engineers, scientists, industry executives and government officials that "I wish I could use this platform to announce that we have achieved a major breakthrough. The fact that this symposium agenda calls for the technical description of a number of systems and techniques is evidence enough that I will not be able to do so."

At this stage, Blatt said, FAA feels it is in a position to establish "certain arbitrary guidelines" for acceptable CAS and PWI hardware.

"A PWI should sell installed for $1,000 or less and be as simple as two-way radio for maintenance," he said. "A CAS may cost as much as $30,000 and be as complex as a doppler navigator with associated computer."

Conspicuity Enhancement program includes studies of paint visibility and various paint configurations.

More than 150 persons, most of them pilots, have completed 25,000 observations or flight problems in 23 aircraft external paint or lighting experiments under FAA's Conspicuity Enhancement program, the Agency's H. R. van Saun reported. Van Saun suggested two possible conclusions based on research findings to date by FAA and a contractor, Applied Psychology Corp., Arlington, Va.: Position and anti-collision lights should be standardized in intensity, quality, placement. The current three-sector (red, green, white) position-light system should be changed to a standard four-sector system in which the after-end white light might be split into separate yellow and blue-white sectors. Another possible modification of current aircraft lighting, he said, might be to build dot-dash flashing signals indicating aircraft altitude into belly anti-collision lights.

*Left,* Joseph D. Blatt addressing symposium on collision prevention. *Right foreground,* Robert J. Shank

# Federal Funds Allocated to Develop 419 Airports

Some $74.3 million has been allocated for development of 419 airports under the Federal Aid Airport Program for the current fiscal year.

The program calls for construction and improvement of 202 airports to serve general aviation exclusively. Forty-six new fields (*see* below) would be built and 156 existing ones modernized at a cost of $18,688,915.

The remaining 217 airports in the program—involving $55,594,804 in Federal funds—would serve both general aviation and the airlines. Funds are included for the construction of four new airfields capable of handling airline traffic.

The allocations were based on a $75 million Congressional appropriation to the FAA for airport development in Fiscal 1963. Of this, $7 million was earmarked specifically for the development of general aviation fields to relieve congestion at airports handling a large volume of airline traffic. The remaining money was to be allocated for other general aviation fields or airports serving all segments of aviation.

Forty general aviation fields are included in the program specifically to help relieve congestion at airports with heavy airline operations. Most of these are existing fields which would be improved to handle a greater volume of general aviation traffic. Four of the "reliever" fields are in the Minneapolis-St. Paul metropolitan area, and three each in the Atlanta, Boston, Chicago and Los Angeles-Long Beach areas.

Financial assistance under the Federal Aid Airport Program is available to public organizations—states, counties, municipalities and other political subdivisions and agencies. Grants are made on a matching basis, with the local agency providing 50 percent of the cost of the airport project and the Federal government matching it.

All projects must be initiated on the local level. Each request for aid is carefully evaluated, and annual programs are developed in line with available appropriations. Priority is given to airports where development will promote the safety of aircraft operations.

Projects included in the program are awarded a tentative allocation of Federal funds. This tentative allocation is, in effect, a notice that money is being placed in reserve pending negotiation of a Grant Agreement. No payment is made until this agreement has been executed.

### New Airports

**Alaska** Sitka*; **Arizona** Phoenix-Northeast, Grand Canyon*; **Arkansas** Malvern, Mount Ida, Osceola; **California** Sacramento*; **Colorado** Loveland, Salida; **Florida** Boca Grande, Live Oak; **Georgia** Blairsville, Thomson; **Illinois** Pekin; **Indiana** French Lick, Tell City; **Kansas** Holton, Stockton; **Kentucky** Bardstown;**Massachusetts** Bourne, Hadley; **Mississippi** Forest, Macon, Magee, Wiggins; **Missouri** Branson, Carrollton, Trenton; **Montana** West Yellowstone*; **North Carolina** Ahoskie, Long Beach-Southport; **North Dakota** International Peace Garden; **Oklahoma** Overbrook, Pryor; **Oregon** Brookings, Cottage Grove; **Pennsylvania** Lehighton; **Tennessee** Camden, Dickson, Fayetteville, Gallatin, Jacksboro, Waverly; **Texas** Yoakum; **Vermont** Island Pond; **Virginia** Grundy, Leesburg, Manassas; **Wisconsin** Park Falls, New Richmond.

*Airline airport

# HALABY HOLDS HANGAR-FLYING SESSION IN CINCINNATI

More than 600 pilots and other airmen in the Ohio area gathered at Cincinnati's Lunken Airport to exchange views with FAA Administrator N. E. Halaby.

Despite early morning bad weather, some 80 aircraft landed at Lunken Airport to participate in the event.

The hangar-flying session, which started with a barbecue, was marked by airborne arrivals of Ohio's Flying Farmers, the 99'ers, the Miami Aerospace Workshop and representatives from the Flying Physicians and Ohio flying clubs.

The next hangar-flying session is scheduled for Detroit's Willow Run Airport on September 15.

# Landing Gear Failures a Common General Aviation Difficulty

Landing gear failures—due to malfunctions and pilot error—are among the most frequent causes of accidents in general aviation.

Wheels-up landings are not uncommon even among the most experienced airmen. Recently, a Texas pilot with 12,000 hours became so engrossed in tower conversation and other traffic that he forgot to extend gear and crashed.

In 1961, 159 accidents resulted from pilots forgetting to lower wheels. Inadvertent activation of landing gear accounted for another 80 accidents, improper procedure in 42 and failure to check gear after extension in 79.

Many mechanical difficulties stem from landing gear rigging problems. Among the most frequent causes are landing gear warning systems malfunctions, limit switches inoperative, gear uplock failing to release, gear downlock failing to engage, and gears hanging-up in wheel wells.

Most of the accidents resulting from such mechanical causes could be eliminated if pilots followed better maintenance and inspection procedures. Landing gear should be inspected at least as often as recommended by manufacturers and required by Civil Air Regulations.

More frequent inspections may be in order if an aircraft is being operated from rough surfaces. In addition, pilots should inspect for damage after a hard landing or after striking an object on the ground. Gear damage also may occur and rigging may be affected by sharp turns at high taxi speeds or by taxiing off a hard surface into deep mud or snow.

Particular attention should be given to the cleanliness of switches and valves that are located on struts and in wheel wells. They are apt to collect mud and debris which might cause a false safe-light indication or stop an extension cycle before the gear is completely down.

Gear rigging should be in strict accordance with the manufacturer's instructions at all times. Every adjustment must be within the limits specified to give trouble-free landing gear operation. Correct lubrication also is important.

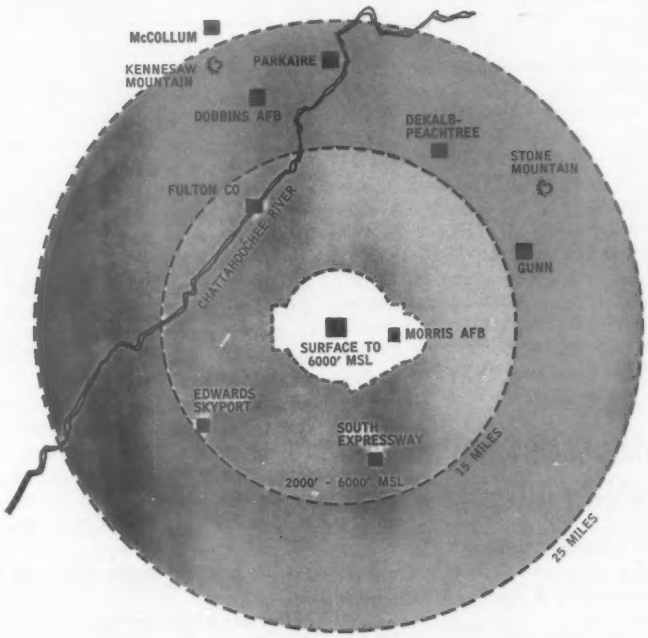
The warning horn is another frequent source of trouble and should be inspected for proper operation. This may necessitate flying the aircraft to assure that the horn blows at the correct throttle setting.

Finally, tires should be checked to make sure they are the right size. Oversized or recapped tires may stick in the wheel well and prevent gear extension.

# Radar Service Expanded for VFR Pilots in Atlanta

Pilots operating under visual flight rules (VFR) will soon receive radar separation service for the first time as FAA continues to expand its radar coverage capability.

VFR radar services, now in limited operation at Washington National Airport, New York-Idlewild, Indianapolis and Atlanta, will undergo major expansion at Atlanta on November 15. The Atlanta Airport Traffic Control Tower will provide VFR pilots with more comprehensive radar service than has been possible until now. The program will make it possible to improve over-all safety by expediting the handling of mixed IFR and VFR traffic and separating the controlled from the uncontrolled aircraft.




A terminal positive radar separation program is being set up at Atlanta which will be available to pilots on a voluntary basis. The service will consist of radar identification, radar vectoring and sequencing and standard radar separation. Advisory service will also be provided to the extent possible.

The new service follows one of Project Beacon's major recommendations for improving air traffic control services—segregating controlled from uncontrolled aircraft around airport terminals. The terminal radar service area will be for the use of participating aircraft. The airspace below the area will be reserved for the use of nonparticipating pilots.

A radar service area will be established around the Atlanta airport extending 15 miles outward from the center of the airport from 2,000 feet up to 6,000 feet. In the immediate vicinity of the airport (the control zone) the floor of the area will be dropped to the ground. The tower approach control facility will provide radar service to all VFR and IFR aircraft operating within the area, including aircraft arriving and departing from nearby adjacent airports as well as the Atlanta Airport, and aircraft operating en route through the area.

Participating VFR pilots will report to Atlanta Terminal Control before entering the terminal radar service area. They will contact the Atlanta tower when over well-established VFR reporting points or radio fixes on the area's perimeter. This will enable Atlanta approach control to establish radar identification. If more than one airplane is holding at a fix, the controller may request a turn for more positive radar identification.

The pilot then will be given such information as wind, runway in use, routing and other traffic information. Once radar contact is established, the pilot will be directed to fly specific headings or routes for proper separation and sequencing with other arriving VFR or IFR airplanes and then directed to follow a preceding airplane making an approach for a landing.

Airplanes flying through the terminal radar service area will be guided along a route that will provide radar separation from all other traffic in the area.

No special airborne equipment will be required other than two-way radio. Special radio frequencies will be set up for the service. If the plane is not equipped with these special frequencies, however, contact with the tower can be maintained by using any of the other general aviation air/ground frequencies listed for Atlanta tower.

The FAA is encouraging participation by VFR pilots in order to obtain valuable operational experience.

Before being implemented, the new service will be outlined in the *Airman's Guide*. A new VFR chart for the Atlanta area will also be available.

## More SST Contracts Awarded

Contracts awarded in the FAA-headed, government-industry supersonic transport research program now total 34. They cover technical problems in aerodynamics, propulsion, structures, materials and operations.

Total value of contracts thus far is $6,151,552, with additional contract effort anticipated in three of them totaling $3,474,136. Another $1,064,435 will be spent by contractors under cost-sharing provisions in their contracts.

Recent contracts awarded include:

**Engine cycle,** General Electric, $248,-087, Pratt & Whitney, $349,960; **propulsion,** Pratt & Whitney, $772,600; **lubricants,** Southwest Research Institute, $349,800; **flight controls,** The Martin Company, $42,206; **jet inlets, exhausts and thrust reversers,** Lockheed Aircraft, $156,170, General Electric, $148,991; **fuel and fuel use,** the Coordinating Research Council, $350,000, Hughes Aircraft, $88,752; **crash-fire prevention system,** Southwest Research Institute, $62,240.

**Materials and structures deformation and stresses,** Bell Aerosystems, $145,451; **wing areodynamics,** Massachusetts Institute of Technology, $140,500; **structures under a variety of conditions,** North American Aviation, $306,891; **resins for radomes and radio antenna housings,** Shell Development Company, $89,947, Westinghouse Corporation, $83,424; **fire extinguishing agents,** National Engineering Science Company, $65,155; **windshield materials,** The Boeing Company, $36,534; **altitude and vertical velocity instrument displays,** Sperry Rand, $31,-050; **experimental flight controls,** Lear, $14,000.

## National Airports Standards Officer Is Appointed

FAA's program to establish safety standards for the nation's airports is well under way with appointment of Captain Frank H. Holt, retired naval pilot, to head the project.

The project was initiated some months ago by the Airports Service to develop guides for airport operators. A proposed National Airport Evaluation System has been published and circulated among airport managers and other aviation industry officials. Comments concerning the proposed FAA evaluation system, by which airport operators may measure the adequacy of their facilities, were received until August 1 by Holt, national airports standards officer.

FAA Administrator N. E. Halaby has emphasized that the proposed evaluation system would be purely voluntary under present rules, and that many airports already meet or exceed the standards. Other airports, however, may find themselves deficient and failure to take corrective action could result in mandatory steps by the Agency to assure adequate safety standards for the nation's airports.

Holt and his staff are reviewing the comments and making surveys throughout the nation to learn how well the airports meet the proposed standards.

The evaluation system applies only to airport facilities which affect safety and is divided into eight major categories—runways, taxiways, aprons, obstructions, lighting and marking, ground safety, aircraft fire protection and medical.

The section covering fire protection establishes a point system for rating airports, based on such factors as aircraft movements, capacities and fuel loads. This section also includes criteria for developing accident emergency plans and training of fire fighting personnel.

The medical section sets forth standards which may be used in first aid and recommends medical support facilities. The section also specifies that a safety officer be designated at each airport.

Standards for runways, taxiways and aprons, based upon type of aircraft and volume of traffic, are also outlined.

## Ex-Administrators Record Histories of Their Terms

Ten of the 16 living former heads of the Federal Aviation Agency and its predecessor organizations have tape recorded the history of their terms for preservation in the FAA library.

The history project began with William P. MacCracken, now a Washington attorney, who was appointed Assistant Secretary of Commerce in 1926. He established the Aeronautics Branch of the Department of Commerce after passage of the Air Commerce Act of 1926. The project continues through the tenure of Elwood R. Quesada, first Administrator of the Federal Aviation Agency when it was formed in 1958. Only Edward J. Noble, Chairman of the Civil Aeronautics Authority and later Under Secretary of Commerce, 1938-1940, and Charles J. Lowen, Jr., Administrator of the Civil Aeronautics Administration briefly in 1956, are deceased.

Most of former Agency heads are still active in careers they were following when they were called to Federal service, a few are semi-retired and many still retain their active interest in aviation.

The 10 men thus far recorded in conversations with Charles E. Planck, who has been in the Agency's public information organization since 1941, are: MacCracken, 1926-1929; Clarence M. Young, 1929-1933; Eugene L. Vidal, 1933-1937; Fred J. Fagg, Jr., 1937-1938; Denis Mulligan, 1938; Robert H. Hinckley, 1939-1942; Donald H. Connolly, 1940-1942; Theodore P. Wright, 1944-1948; Charles F. Horne, 1951-1953; and James T. Pyle, 1956-1958.

Interviews will be recorded later with Clinton M. Hester, 1938-1940; Charles I. Stanton, 1942-1944; D. W. Rentzel, 1948-1950; Donald W. Nyrop, 1950-1951; Fred B. Lee, 1953-1955; and Quesada, 1958-1961.

## Alert Pilots Could Have Prevented All 21 Mid-Air Collisions in 1961

All 21 mid-air collisions involving general aviation aircraft last year could have been avoided if the pilots had been more alert.

George C. Prill, Director of FAA's Flight Standards Service, pointed out that in every accident one or both pilots had ample opportunity to see the other aircraft and take evasive action.

"We believe that the most effective means of avoiding collision accidents is the vigilance of all pilots at all times under all circumstances," Prill said.

The 21 mid-air collisions in 1961 were three less than the total for 1960. Only nine of the collisions resulted in fatalities. The total number of deaths was 21. (There were no collisions involving airliners last year.)

Twelve collisions occurred within airport traffic patterns, eight were between aircraft intentionally flown in formation or close association with each other, and at least 15 involved aircraft of identical or very similar flight performance.

The most serious accident occurred in April 1961 when four persons died in the crash of a Cessna 172 and Beech 35 at Riverside, Calif. The aircraft collided at the 45-degree entry point to the downwind leg of the traffic pattern. The Cessna was struck as it turned in front of the Beech to the downwind heading.

Two persons were killed in the collision of a Cessna 180 and Beech T-34 near Payson, Ariz., in June 1961. Both aircraft were engaged in a forest fire borate-bombing operation and were in radio contact with each other. The right wing of the Beech severed the fuselage of the Cessna nine feet forward of the tail cone during a turn over the fire zone.

## SKY SHIELD III

SKY SHIELD III, the third annual North American Air Defense Command training exercise, will take place September 2, for five-and-one-half hours beginning 3:00 P. M. EDT (1900 GMT September 2 to 0030 GMT September 3).

All civil flights over or into the United States and Canada will be suspended during these hours in the interest of aviation safety and national defense. The exercise will affect Alaska for only three-and-one-half hours—from 3:00 P. M. EDT.

Last year the exercise was held on October 14 and lasted for 12 hours.

The date and time of this year's exercise were chosen for minimum disruption of civil aviation.

The SKY SHIELD III operation will provide the necessary framework to exercise the North American Air Defense System as a whole and is thus an important training operation, essential to defense readiness.

## PUBLICATIONS AVAILABLE

**National Airport Plan,** 1962—$2.25

**Air Traffic Control Procedures,** July 1, 1962—$2.00 (Yearly subscription)

**Air Commerce Traffic Pattern,** Calendar Year 1961—.50

**Part 1, Federal Aviation Regulations.** Definitions and Abbreviations, Effective May 15, 1962—.25

Available at prices listed from:
Superintendent of Documents
Government Printing Office
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**Jennies to Jets**—The Development of U. S. Civil Aviation—Free

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Inquiry Section, MS-126
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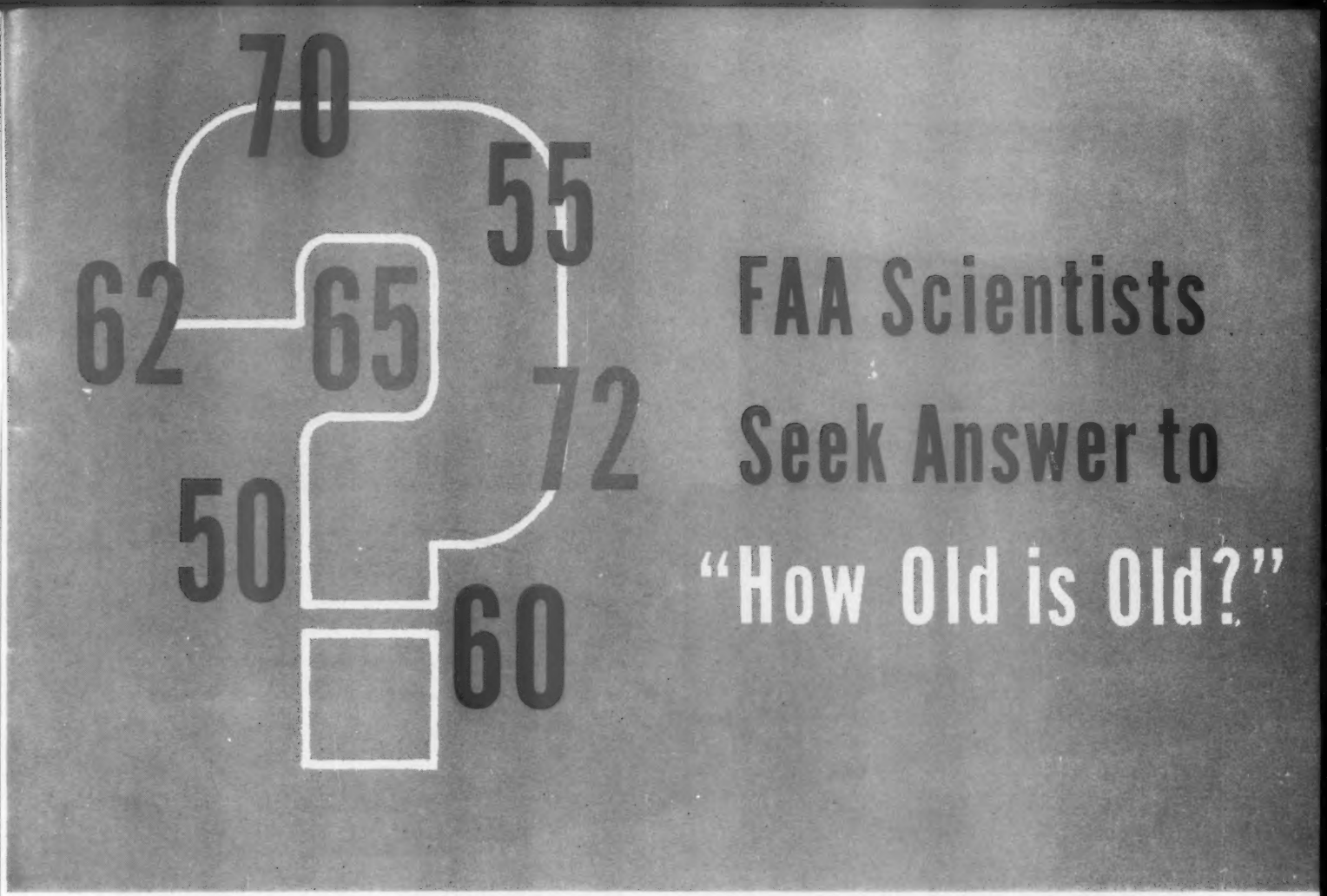
Washington 25, D. C.




# FAA Scientists Seek Answer to "How Old is Old?"

Exploration of man's aging process, a pioneering FAA aeromedical research program, will take a major step forward by the end of the year with the beginning of airborne observations of flight crews at work in the cockpit.

FAA researchers are probing the process in which man ages physically with the hope of eventually determining standards that could be applied to pilots. With such criteria, individual judgments could be made of the physiological age of each airman and how it might affect his flying performance.

These standards would permit determination of such factors as retirement age more precisely than the criterion of chronological age now used with airline pilots for lack of a better standard. The research also will make a significant contribution to medicine generally, since no extensive work has been done in this field.

Airline pilots presently must retire at 60. This requirement is based on the best medical statistics available. They indicate that after 60, the possibility of sudden incapacitation increases significantly and reduced efficiency can be expected.

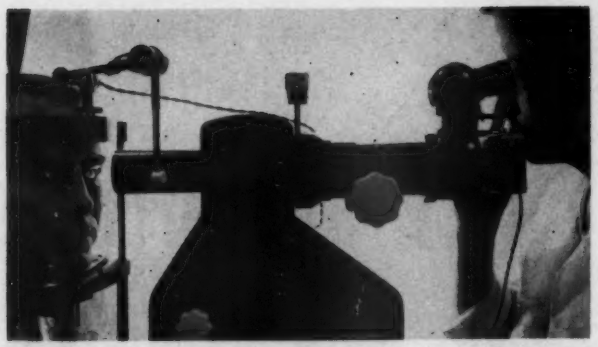
While issuing this rule in the interest of air safety, the FAA also launched its research into the aging process to see whether standards could not be developed which would produce a measure of the true physical age of each pilot.

Conducting this program is a small but highly trained medical research group operating at Georgetown University Hospital in Washington. The Clinical Research Branch is headed by Dr. Arthur E. Wentz and totals 30 scientific, technical and supporting personnel.

The program began in February, 1961 when researchers began a series of periodic examinations of volunteer pilots, air traffic controllers and university personnel. First step was to establish a control group of about 500 with records of examination results maintained over an extended period. Results of pilot studies will be compared with those from this control group.

The airborne studies will provide a means of verifying the laboratory data by conducting the same type of tests on volunteers under actual flying conditions. The research will be carried out in a Beechcraft equipped with 200-300 pounds of testing equipment. Studies will include heart observations, performance tasks, brainwave and pulmonary studies and some vision and hearing tests. The data will be recorded either directly or telemetered, with the latter conducted chiefly from FAA's Civil Aeromedical Research Institute in Oklahoma City while the other tests will be carried out in the Washington area.

Although it will be several years before the current pro-



Color photographs taken of back of the eyeball at regular intervals show progressive changes in the blood vessels indicative of the aging process.

Peripheral vision, so essential to pilot proficiency, is carefully measured.

gram yields the necessary base line information for future research, there already has been one significant finding. Studies show that even where there is a mild coronary condition, there is a marked reduction in performance efficiency. Conversely, such a reduction in performance might indicate existence of a coronary condition. This is one of the areas for further research.

Studies at Georgetown Clinic are being carried out in seven major areas:

• **Visual studies**—The eyes are particularly useful for studying aging because they reflect blood vessel changes and many types of chronic illnesses long before they otherwise become obvious. Included in the tests are color photographs of the back of the eyeball which show the caliber of the blood vessel changes associated with aging. In addition, a pupillograph tests the pupils of the eye to record size and reflexes under controlled conditions. It is believed that the rate of response of a fatigued individual is indicative of physiological aging. The test also aids in determining neurological conditions. Brightness contrast, color hue discrimination and critical flicker fusion investigations are also being made.

• **Auditory**—Hearing research is enhanced by the use of selected words against various noise backgrounds, in addition to conventional standard measurements of hearing.

Pupillograph, one of half a dozen instruments of its kind in the world, measures dynamically the pupil's response to light, noise and other stimuli.

• **Bio-Chemical Section**—Responsible for seeking ways to apply to medicine the latest developments in physics and electronics. Out of this has come the development of an analog computer system that rapidly evaluates lung function.

• **Pulmonary**—This section is attempting to establish a Physiologic Age Rating (PAR) for pulmonary functions by means of several approaches. These include the measurement of air flow and carbon dioxide at rest and during exercise, and the measurement in performance changes caused by breathing larger than normal concentrations of gases. These will provide an indication of the effect of aging upon respiratory center sensitivity.

Lung function is evaluated by measuring velocity and percentage of carbon dioxide that subject exhales while doing a measured amount of work. Data is recorded on magnetic tape and then analyzed with an analog computer.

• **Neurological study**—Concentration exams that reflect the condition of the central nervous system, and exams that screen subjects for early pathological changes. An analysis of electroencephalograms over a period of time may provide unsuspecting clues on aging when correlated with clinical findings. Analysis of rheoencephalograms may provide a quantitative determination of cerebral blood flow and predict changes before they become apparent.

Wired for research. Electrodes attached to subject's head and connected to electroencephalograph in adjoining room record brain wave patterns and give researchers considerable data on coordination, alertness and reflexes.

On ballistocardiograph, a vibrationless "bed" suspended to minimize gravity, microphones measure heart which normally vibrates 5/1,000 of an inch.

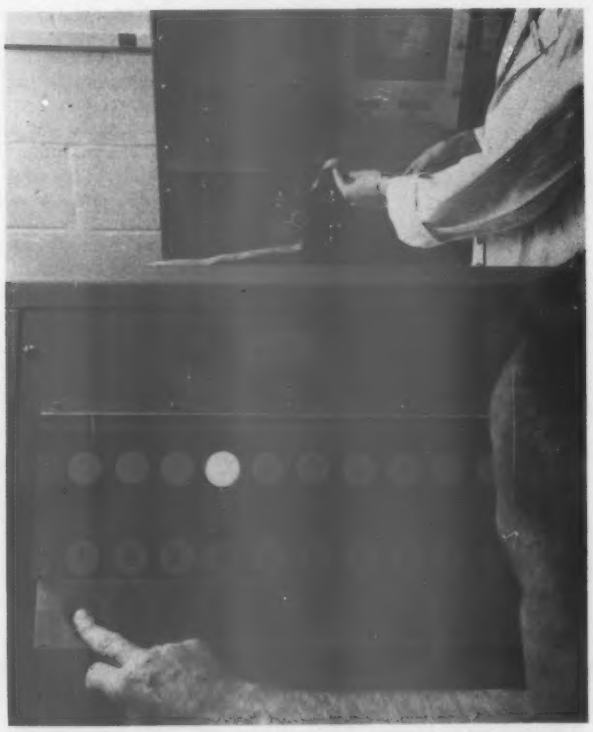
• **Cardiovascular**—Major research objective is to apply a variety of test procedures for evaluating circulatory function. The results are expected to provide a more sensitive index of the capacity of the cardiovascular system and its relation to age. Scientists also are studying stress factors contributing to blood clotting.

Electrocardiogram taken while subject exercises measures sequence of heartbeats. Technician records them on tape for comparison with future readings.

• **Behavioral sciences**—A subject's performance is measured as he carries out various tests. All task-scores are known to be related to age. Some are also valid indicators of some type of brain injury or malfunction. The test battery is still being developed, and it is hoped that the final battery will provide accurate measurement of the abilities important in flying and other demanding work, and will either correlate with or predict illnesses.

Although it will be some time before the study will provide results, the program is well under way. Some form of automatic data processing system will be needed to process the amount of data secured. When it becomes possible to determine that a man of 60 has the physical age of a much younger man or vice versa, the contribution to medical science will be invaluable.

Testing speed and accuracy of reaction of eye, brain, hand to visual signals.



# FAA Test Pilots Train on Variable Stability Plane

Flying an airplane that can be made to respond like a supersonic fighter one minute and a slow-moving transport the next is the training task assigned to 10 FAA test pilots attending a course given by Cornell Aeronautical Laboratory of Buffalo, N. Y.

Purpose of the training program is to give the pilots greater practical understanding of airplane stability and control handling qualities through actual flight observation. The experience will help them recognize and cope with hazardous flying characteristics when flight testing the broad variety of new or modified aircraft presented for FAA approval.

A B-26 variable stability aircraft, containing a special automatic flight control system designed and built by the Cornell Aeronautical Laboratory, is used in the program. Heart of this system is a complicated series of servos which drive the control surfaces. By varying the signals to these servos, the aircraft can duplicate the handling characteristics of any plane.

Only the student pilot's controls are connected to the servos. This permits unconventional and unstable configurations to be tried out safely in flight since the instructor pilot can override the servos at any time and assume normal control of the aircraft.

Flight training is augmented by classroom lectures.

The FAA test pilots attend the course in shifts of two over a six-week period. Each pilot spends eight working days in training and flies the B-26 on four two-hour flights for a total of eight hours. The flight demonstrations are supplemented by lectures and informal discussions. The entire program for the 10 pilots is expected to be completed this month.

Development of the B-26 used in the program was started in 1951 under Air Force sponsorship. The aircraft also has been used by the Navy for its test pilots.

The Cornell Aeronautical Laboratory also operates a T-33 variable stability aircraft which was used in training pilots for the X-15. Another airplane with variable stability equipment, an F-94, was used to simulate the control feel and handling characteristics of the B-58 prior to its initial test flight.

During the first two flights, the FAA pilots investigate the effect of handling qualities such as natural frequency, damping ratio, control force gradient and control friction. Neutrally stable and unstable characteristics also are experienced.

The third flight shows the interrelation of these characteristics. The effects of configuration changes which might occur during the operation of a given airplane also are demonstrated. For example, the effects of varying center of gravity positions can be demonstrated, as well as effects of failure of stability augmentation equipment during a critical flight phase.

The last flight shows how changes in the stability and control characteristics affect the ability of the pilot to perform a task such as an instrument approach.

## Pilot-Forecaster Weather Service To Be Continued, Expanded

A year-long test of round-the-clock pilot-to-forecaster weather service at Washington and Kansas City will be continued on its present radio frequency, 122.6 mc., until October 1, when FAA will expand the service to include Los Angeles.

After October 1, a new frequency will be selected for all three stations. It will have a potential for national application, which 122.6 does not have.

A joint venture of FAA and the Weather Bureau, the pilot-to-forecaster service has proved a beneficial addition to the standard weather services. By switching to 122.6, pilots in flight speak directly to qualified meteorologists and get help when it is most needed—when weather aloft is changing and sudden and hazardous conditions arise. Also valuable is the on-the-spot information that forecasters get from pilots and immediately make available to other pilots and air traffic controllers. For routine weather and in-flight briefings, pilots should continue to contact Flight Service Stations.

At Kansas City, forecasters and meteorologists work in the Weather Bureau forecast center. In Washington, they are in the same room with the controllers at the Air Route Traffic Control Center. The single transmitter-receiver outlet at Kansas City has a range of approximately 150 miles; Washington has transmitter-receiver stations set up at Front Royal, Roanoke and Richmond, Va.; Raleigh-Durham, N. C.; and Elkins, W. Va., which give it a much wider range.

Forecaster at weather scope talks directly to pilot.

Each city has a different weather environment. Kansas City is in the so-called tornado belt and experiences more drastic weather changes than does Washington. They also serve a somewhat different group of aircraft.

Washington gets a larger number of general aviation air-ground contacts than does Kansas City, On the other hand, Kansas City gets a greater number of air-ground contacts from airplanes flying through the area.

In Los Angeles, a still different set of factors will be evaluated. The high percentage of jet flights and a completely different group of aircraft—the heaviest concentration of general aviation pilots and aircraft in the country—plus weather conditions peculiar to the West Coast, will give FAA a third laboratory for the pilot-to-forecaster weather service to assist in determining the best location for the forecaster and the most effective air-ground communications configuration.

## ROTOCRAFT RULES CHANGES PROPOSED

Following the establishment of two classes of rotorcraft—helicopters and gyroplanes—FAA now proposes to apply different aeronautical skill standards to each.

The proposed revision to Part 20 of the Civil Air Regulations would apply current skill standards to helicopters only, and add specific standards for gyroplanes. In addition, a knowledge of radio aids and VFR navigation would be required for a private pilot certificate with rotorcraft rating.

Written comments should be submitted on or before September 13, 1963, to the Docket Section, Federal Aviation Agency, Washington 25, D. C.

# *Maintenance is Key to Navaid Reliability*

Technician in Depot Shop mikes a piece of quartz crystal as the first step in producing an accurately ground Piezo-electric frequency control device.

FAA's worldwide navaids system, operating at a near-perfect 99 percent reliability, is the result of a meticulous program of preventive maintenance.

Core of the program is the Agency's Aeronautical Center in Oklahoma City. There, at the FAA Depot, skilled technicians and engineers calculate outages —or failures—of navigation aids based on hours in use. In most cases they have been able to predict a time factor within a few hours of actual breakdown time. The centralized system affects U. S. navaids wherever they are located—from Indiana to Iceland and Wake Island to Wyoming.

Electronic specialists have determined fairly accurately, for example, that the average Precision Approach Radar component will operate efficiently for 2,000 hours, and that a certain VOR part will do its job for about 12,000 hours. Any number of operating hours beyond that time would place the particular navaid in the range of uncertain operation.

But preventive maintenance thwarts failure. By checking their comprehensive records, and service time limits, the field engineer or technician knows when to install a new or rebuilt component in the facility and ship the used one to Oklahoma City for overhaul. Once repaired, it is kept in the stockpile of parts until shipped back to the field—and not necessarily where it originally saw operation.

More than 16,000 items, from those weighing just a few ounces to parts weighing hundreds of pounds, are funneled in and out of the Depot each year for repair, overhaul or modification. The list is endless: goniometers for VORs, antennas for Precision Approach Radar, transmitters and monitors, Instrument Landing Systems, overlay maps for radar screens, Piezo-electric crystals of all types, automatic engine-generators, rotating and gear-train mechanisms and hundreds of others.

The shop at the Depot works on an exchange-and-repair, repair-and-return and special transactions basis.

If the Depot cannot supply an exchange item, the field facility can send the part in for repair and return. Meanwhile, stand-by equipment is used. If the item is beyond repair or cannot be modified to meet new requirements, an entirely new item can be manufactured and supplied as a special transaction.

FAA design engineer checks specially-built hoist equipment used to help install TACAN antennas.

Piezo-electric crystals, for example, used in the control of radio frequency transmission, have to be custom processed, tested and supplied on crystal requisitions. Upon request, the required crystal is ground and tested to particular specifications. Each crystal must be custom-tailored to the particular radio frequency in which it will be used.

Such attention to detail, coupled with an efficient maintenance system, give pilots navaids they can depend on.

Overhaul and calibration of testing equipment, such as this tube tester, is another important job in assuring reliability of navaids.

Calibration crew at test mount carefully plots patterns of recently overhauled antenna array used on a Precision Approach Radar.

In sprawling Depot Shop, technicians work on a variety of transmitters and receivers. Each technician is a specialist on FAA air navigation, communications or radar equipment that comprises airways system.

Mammoth interior of mockup of Lockheed C-141 Starlifter jet cargo plane designed with both military and civil requirements in mind.

# FAA Participates in Air Force Development of Jet Cargo Plane

A new Air Force jet cargo transport now moving into the production stage at the Lockheed-Georgia Company's plant near Atlanta is designed to insure FAA civil certification.

The turbofan-powered Lockheed C-141A is being developed by the Air Force to meet urgent military airlift requirements. The FAA is participating in the program with the aim of certificating the airplane at an early date. The civil version will be designated the Model 300.

From the start of the C-141 project, the FAA has exerted every effort to see that the plane is compatible to the maximum extent possible with civil needs. FAA has had full Air Force cooperation to this end. Among contributions to the design specifications initially were requirements set forth by airlines throughout the country at the request of the FAA. These were fed into the Department of Defense design hopper along with military requirements.

Normally, a military aircraft is designed for the military customer and the FAA evaluates it in a civil certification program later if the manufacturer decides to put it on the commercial market. The Federal government wanted to help provide a new, efficient jet cargo transport for the airlines in the shortest possible time. The program also offered the advantage of lower commercial prices because of the larger volume of military orders.

Assembly began in June on the first C-141A Starlifter aircraft. The first flight is scheduled for next year.

The C-141A is a high wing, T-tail, aft-loading airplane powered by four TF33-P-7 Pratt and Whitney turbofan engines. The thrust of each engine is 21,000 pounds. The wing is swept 25 degrees, wing span is 160 feet and over-all length is 146.1 feet. The highest point on the tail is 39 feet.

Maximum payload for the dual purpose jet is approximately 93,000 pounds. Empty weight of the airplane is 129.000 pounds. The C-141A can carry 150,000 pounds of fuel or approximately 23,000 gallons. Maximum takeoff weight is 316,-600 pounds and landing weight is 257,500 pounds.

The main landing gear on the C-141A is housed in streamlined pods on each side of the fuselage. It is a dual wheel, bogie-type gear.

The C-141A will be able to fly with a large payload non-stop from the West Coast of the U. S. across the Pacific Ocean to Japan. Thus, it is to be the first true intercontinental jet-powered cargo carrier.

As an Air Force plane, the C-141A can serve as a troop-passenger, cargo and aerial evacuation plane, simultaneously. Using side facing seats, 118 fully equipped paratroopers or 164 combat troops, or 108 litters and 18 attendants, can be airlifted. Virtually any combination of mixed goods can be carried in the 7,156 cubic foot cargo compartment, which is 109 inches high, 123 inches wide and 70 feet long.

Features which will be useful to civil operators are: truckbed height loading, civil cockpit standardization, birdproof windshield, improved low approach capability, improved reliability of engines and airplane from both civil and military operating experience and self-sufficiency in line maintenance access. The airplane will not require large stands for repair work, since ladders and openings are designed for easy access to all locations.

Other items include standards of fire protection and fail-safe structure and system design, enabling the airplane to complete its flight in the presence of a complete failure of any one system such as the hydraulic system. Programmed by the FAA's Systems Research and Development Service, as part of its over-all

program in the area, is research and development effort on the plane's instrument flight system. FAA's Aircraft Development Service, SRDS's companion development group, has over-all responsibility for FAA's role in the Starlifter program. The SRDS instrument flight work is in coordination with closely-allied Air Force research programming.

Civil standards of cockpit visibility are provided, including such items as a panel of the windshield which will open, anti-icing, rain removal and other features which might not be on a military plane but are required under civil regulations.

In flight, both cargo compartment and flight station are pressurized for 8,000-foot cabin altitude at 40,000 feet, or sea level cabin altitude up to 21,000 feet. Takeoff distance over a 50-foot obstacle at 316,000 pounds is 5,330 feet. Maximum cruise speed is 485 knots, with a long-range cruise speed of 440 knots.

Taped instruments have been proposed for the C-141A. Although the FAA at first was concerned with the readability of this type of instrument, many design problems are being resolved by extensive flight and simulator evaluation and these new-type instruments now look feasible. These include the engine instruments, flight instruments, fuel flow and others.

The Air Force started on this project in 1959. FAA started work on the program in 1960 at the request of USAF and under a mutual agreement to review specifications by which the airplane and all components are purchased to establish that nothing would preclude type certification. The civil certification process was begun in March, 1961.

Close-up of the C-141A Starlifter cockpit showing control panel and proposed new taped instruments.

The FAA preliminary type certification board has taken a look at the over-all development of the aircraft. This board establishes an acceptable basis for certifying the aircraft for commercial use. Systems reviewed include flight station lighting, power plant package, wing trailing edge, air conditioning and controls, plus drawings for the electrical and avionic wiring system.

Wind tunnel model of new military-civil jet cargo plane at Cornell University.

## Administrator Adopts Written Policy Guide For Rulemaking

A written policy providing basic rulemaking guidance in the safety and air traffic fields has been adopted by an FAA Administrator for the first time.

The order states that in adopting necessary safety rules and regulations, the public interest and the promotion, encouragement and development of civil aviation will be served.

In developing rules, two considerations are fundamental: First is to utilize all available resources, both in and outside the Agency, to secure all information on the need for a rule, any alternative means of meeting that need, and the consequences of proposed rulemaking action. Second is to question and weigh this information in order to demonstrate, in depth and in balance, that adoption of a rule is justified.

The policy provides guidelines for determining the justification: Is the matter within the Agency's statutory authority? To what extent has the requirement been demonstrated? Is it more than a requirement of convenience to the regulators? What burdens will it impose?

The application and format of the rule also is to be considered: How will the rule be managed if it is adopted and will it respond to reasonable surveillance?

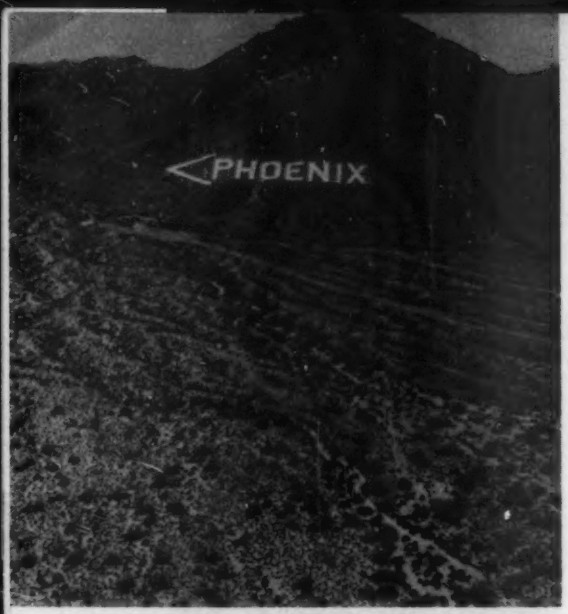
Public participation is required in rulemaking, except when emergency action is required for the protection of public interest and safety. Without foregoing its rulemaking responsibility, informal consultation with the public is encouraged even before the rule is proposed, particularly with those members subject to the Agency's regulatory powers.

The policy stresses that the Agency seeks the facts, listens, reasons and then decides and acts without fear or favor.

## Arresting Gear Contract Extended

A contract for the development of emergency runway arresting gear for jet transport aircraft has been extended by FAA. The new $431,185 contract went to All American Engineering Company, Wilmington, Del., which has been working under a $587,301 contract in this vital area for the past two years.

All American-designed arresting gear and tail hook equipment for transport aircraft have been tested in dead-load shots of up to 300,000 pounds that have been arrested at speeds up to 120 knots. Under the extension, dead-load testing will continue, followed this autumn by dynamic tests with landing craft.




Largest air marker in the world was built by Air Explorer Scouts on Usery Mtn. On a clear day, the 100-ft. letters of painted stone can be easily seen from 50,000 feet and 35 ground miles away.

# Signs on the Ground Point the Way in the Sky

In an age characterized by supersonic airplanes and complex avionic equipment, a basic navaid—the air-marker—is the product simply of a coat of paint and determination.

Two Presidential task forces, Project Horizon and Project Beacon, have recognized the air-marker as essential to flying safety. A major recommendation of the Beacon report was that FAA's air-marking program be expanded. The report emphasized the necessity of air-marking around terminal areas where VFR traffic continues to increase.

Despite the lack of money—no Federal funds have been available for the purpose for the past 15 years—FAA has carried out an active air-marking campaign with considerable success.

Under the direction of a veteran pilot, Mrs. Blanche Noyes, FAA has encouraged state and city governments, industry, business and fraternal organizations, professional groups and interested individuals to install air-markers on their own. The result, due in large part to the cooperation of the various state aviation directors, is some 8,000 readable air-markers throughout the United States today.

Eighteen states have continuing air marking programs supported by yearly appropriations. Every town in Alabama, Florida, Pennsylvania, New York, Ohio, Minnesota, Idaho, Iowa, Wisconsin, Montana, Michigan, Tennessee, South Carolina, Connecticut, South Dakota, Virginia, West Virginia and Nebraska has an air-marker. In addition to putting up new ones every year, these states systematically replace the old ones as they fade and tend to become illegible. Life expectancy of a marker is three to four years, and the cost is about $60 whether new or renewed.

Pilots in New York and Ohio may also orient themselves by looking at the roofs of the toll houses on state turnpikes and checking the numbers on sectional aeronautical charts. Recently, in Ohio, air-markers have been added to the cloverleaf intersections of major highways. The numerals and letters, of crushed white rock 20-feet high and laid out on closely-cut grass, are highly visible and extremely effective from the air.

FAA now is developing plans for air-marking hospital heliports and for experimental markings that will identify corridors to high density airports.

As an incentive for furthering air marking, FAA is also promoting the development of inter-state skyways for VFR fliers. These are air routes laid out over the best terrain, along which communications, weather reports and hangar and airport facilities are readily available.

After testing many different kinds of markers over the years, FAA recommends painting the name of the town on the roof of a large, conspicuous building in chrome yellow letters on a dark background, with an arrow pointing in the direction of the nearest airport, and the distance to it indicated in 10-foot numerals.

Tollhouse on New York State Thruway *(left)* gives pilot a number he can find on his sectional aeronautical chart. *Center*, Mrs. Blanche Noyes, chief of FAA's Air Marking Section, flies hundreds of hours annually checking markers and looking for suitable sites. *Right*, standard air marker on roof of Fairfax (Va.) High School.

# Letters to the Administrator

FAA

***Over the past year, the FAA has been working hard to improve relations and establish better communications with the aviation community. Administrator N. E. Halaby recently wrote a letter to airmen as part of this effort to report on FAA programs and their progress. Among the responses were the airman comments published here.***

***FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. Please keep them brief. No anonymous letters will be used, but names will be withheld on request.***

### • Easterwood Tower

You certainly raised a few eyebrows around here when you stated ("Letters," June *FAA Aviation News*) that Redbird, Lufkin and Easterwood airports in Texas have no towers.

I suppose no one knows that Easterwood exists because of the smooth and efficient way those boys expedite traffic into and out of the field. I think they deserve a vote of thanks for the friendly and purposeful way they handle traffic.

J. Pemberton
College Station, Texas

*The error regarding Easterwood resulted from the fact that it is listed in the* Airman's Guide *as College Station Airport. Incidentally, since the June issue went to press Redbird also has acquired a control tower.*

### • Expired Certificate

I received my private pilot's license on July 20, 1931. Recently an FAA inspector looked at my certificate and stated that it was not valid; that I was unlicensed because my certificate expired in October 1932.

It was my understanding that airman's certificates remained in effect until suspended, surrendered or revoked, and that my certificate was automatically valid providing I had a valid medical certificate, which I had. The inspector stated that that regulation applied only to certificates dating back to 1945, that I would have to start all over again, procure a student pilot's certificate, take another written examination and another flight test.

I personally feel that this certificate regulation is very unfair and unjust to those of us who procured our certificates prior to 1945.

Kenneth R. Ham
Hingham, Mass.

*Your present certificate, having been issued July 20, 1931, was valid until July 1, 1945. From that date until as late as August 23, 1956, it could have been exchanged for a new certificate upon application. It will now be necessary for you to comply with the current requirements for securing a private pilot certificate. The old number, however, may be carried forward to the new certificate if you request it.*

*The only way that you could be issued a new certificate without passing the written and practical tests would be by means of an exemption to those sections of Part 20 of the Civil Air Regulations governing the requirements for a private certificate. Grants of exemption are issued upon a finding that the action is in the public interest.*

### • Airmen Fitness Levels

My concern is that medical standards appear to be getting tougher and I cannot quite justify in my mind any need for excessive medical standards. In many cases judgment and ability are more important, although I can see some need for stricter medical standards for pilots flying high-performance aircraft. You might give consideration to establishing private, commercial and instrument ratings for the slower aircraft that would permit anyone in good health to obtain and keep a license. Certainly today's aircraft, equipment and instruments are far better than those in use just a few years ago, thus making flying easier, not harder.

I am not in complete agreement with the decision to establish tighter controls on VHF transmitters and receivers—ostensibly to permit more frequencies. Certainly more frequencies are required, and if this is necessary then I would agree with the decision; however, there seems to be considerable dissent from the aircraft radio manufacturers concerning the necessity for this tolerance.

William A. Thomas II
Craig, Colo.

*There has been no revision in the medical regulations for the past year and a half. Those that have been made in the past were adopted only after thorough study and careful consideration of the opinions expressed by the aviation community. The FAA does provide for fitness levels for the three types of airmen medical certificates which are issued. Airline pilots, for example, operate under different medical standards than do private or student pilots. The requirements for the latter, naturally, would be considerably less strict.*

*As for your concern over tighter radio frequency tolerances, this is a responsibility of the FCC. The Commission currently has a rulemaking action under study on this subject. Your comments can be forwarded to the Federal Communications Commission, Washington 25, D. C.*

### • Two-way Radio Rulemaking

I am concerned with the effect made by the ruling making it mandatory to have two-way radio in order to operate out of an airport having a Federally-operated tower. There is one airport I have particularly in mind—the Rio Grande Valley International Airport at Brownsville, Texas. This airport, as your charts will show you, has not much traffic.

Two-way radio is fine to have, if you can afford it and if it won't overload your aircraft. But there is another point to mention. To me, and I make my living as a pilot in the agricultural flying industry, flying is still fun and a pleasure. To burden pilots who fly for pleasure and business with unnecessary requirements is detrimental to the over-all welfare of aviation in the United States. I certainly go along with enforcing the regulations but let us have some that make sense.

Usually we are given a chance to air our views before a new regulation becomes effective. I don't remember being given prior notice on the two-way radio change. I hope pilots will wake up and let their ideas be known in the future to help prevent rules being made that are not necessary.

Donald J. Goode
Harlingen, Texas

*The requirement for a two-way radio for landings and takeoffs exists where there is an FAA tower. An FAA tower is installed only at airports that have a minimum of 24,000 itinerant operations a year. When sufficient justification exists, it may be possible to arrange for prior clearance from the tower without a two-way radio. The two-way radio requirement was adopted only after carefully weighing the relative moderate cost factor against safety. The proposal was submitted for public comment October 7, 1960, prior to adoption September 22, 1961. The effective date of the rule was December 26, 1961.*

### • Helping Hand

When the word "Mayday" is transmitted it puts into operation a well-oiled professional machine. While conducting spin tests on an experimental airplane I was forced to bail out over water. I'm sure that before my feet hit the water the pilot of an FAA chase plane, Frank E. McGowan, had the Vero Beach Flight Service Station alerted. They notified no less than five rescue units. I hit the water at 11:02 and was pulled into a boat at 11:30.

It's a comforting thought to know that at a moment's notice help is on the way through the efforts of men like these.

C. R. Wellmaker
Vero Beach, Fla.

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**This month cartoonist Robert Osborn, in his usual place on the next page, points out a seasonal phenomenon—hot weather "shortens" runways. For other seasonal changes in your airplane's performance, check the manufacturer's operating manual.**

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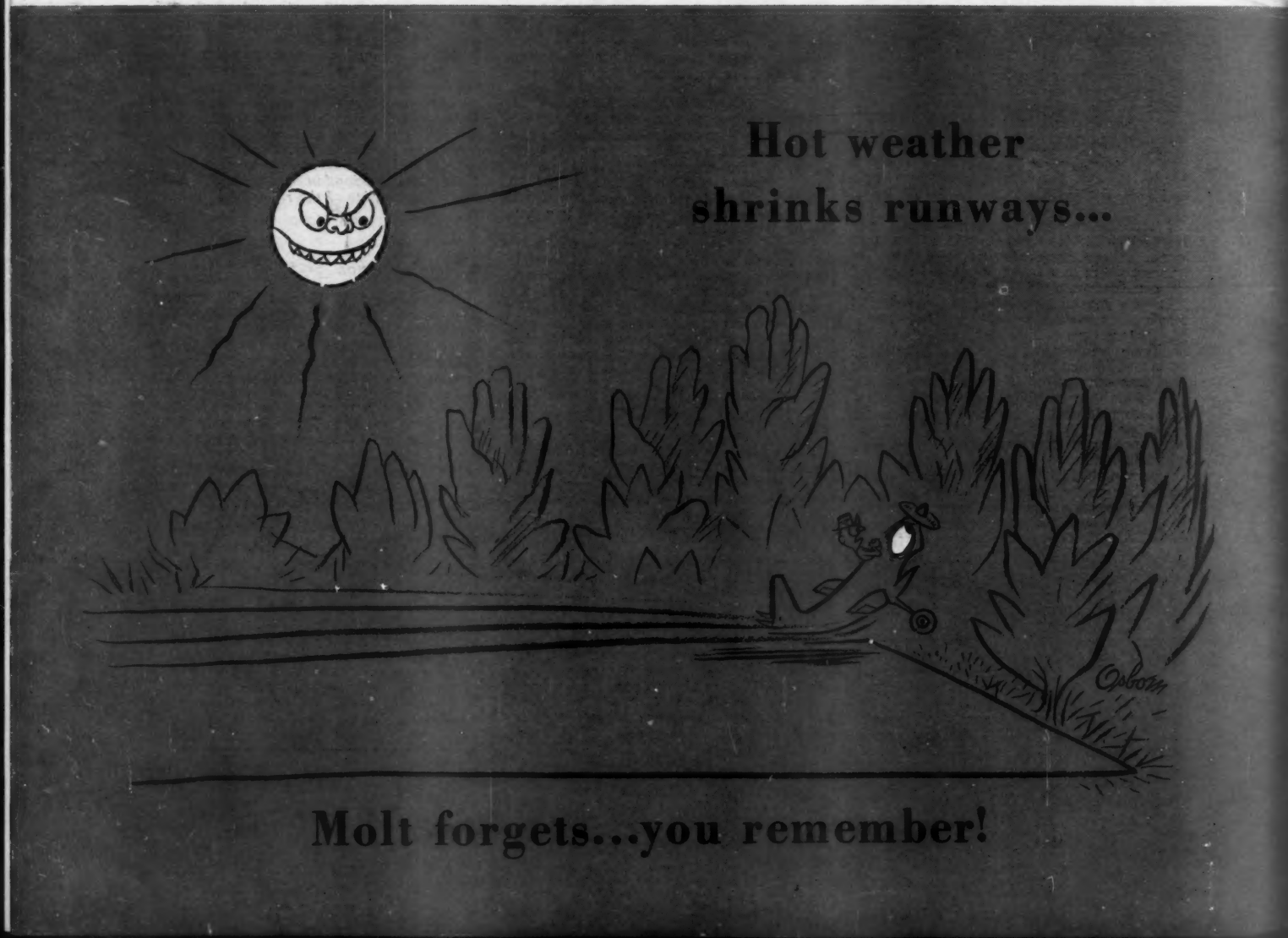
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